is taking place, the vortex it creates causes a disturbance that extends a considerable distance into the vessel. This can disturb the gravity separation and the water and the oil may become mixed together again. The vortex can also draw oil into the apparatus so that oil is discharged in the slurry. If this happens then the oil will usually have to be separated from the slurry to avoid pollution and monetary loss.

According to a first aspect of the present invention there is provided fluidising apparatus including:

a supply duct for supplying liquid under pressure to a lower portion of a vessel containing a fluidisable material, the supply duct extending into the vessel and including at the outlet end thereof one or more jets for directing the flow of liquid into the vessel substantially transversely to the major axis of the supply duct, and

an outlet duct for removing the fluidised material from the vessel.

The outlet duct may surround the outlet end of the supply duct and may be substantially co-axial therewith.

The inlet end of the outlet duct may be protected from ingress of non-fluidised material by a flange member adapted to divert the flow of fluidised material past the underside of the flange member before entering the inlet end of the outlet duct. The flange member may be fitted around a portion of the supply duct located inside the vessel.

The flange member may also assist in directing the fluidised material towards the outlet duct. The diameter of the flange member may be at least equal to an adjacent portion of the diameter of the outlet duct. The flange member may include a groove on its surface facing the outlet duct. The outlet duct may project at least partially into the groove. The distance between the outlet duct and the flange member may be adjustable.

the vessel. The apparatus may further include a hydrocyclone, typically adjacent the outlet duct.

According to a second aspect of the invention there is provided a vessel fitted with a fluidiser apparatus substantially as described above.

The vessel may be an open or closed pot. The supply duct may be connected directly to the outlet duct via a valve. The valve can allow the concentration of slurry in the outlet duct to be adjusted.

The outlet duct may pass through a cyclone, preferably a pressure reducing cyclone having a single outlet. The flow rate at the outlet duct may be sensed and the flow rate in the supply duct is controlled accordingly.

According to yet another aspect of the present invention there is provided a method of treating fluidisable material in a vessel, the method including steps of:

supplying liquid under pressure to a vessel, the liquid being emitted into a lower portion of the vessel as one or more jets substantially transverse to the major axis of the supply duct, and

removing the fluidised material from the vessel.

Whilst the invention has been described above, it extends to any inventive combination of the features set out above or in the following description.

The invention may be performed in various ways, and, by way of example only, embodiments thereof will now be described, reference being made to the accompanying drawings, in which:-

Figure 1 illustrates schematically an open vessel fitted with a fluidiser;

Figure 2 details a first embodiment of the fluidiser, and

Figures 3 to 9 detail alternative embodiments of the fluidiser.

CLAIMS

1. Fluidising apparatus including:

a supply duct (1) for supplying liquid under pressure to a lower portion of a vessel (11) containing a fluidisable material, the supply duct extending into the vessel and including at the outlet end thereof one or more jets (212) for directing the flow of liquid into the vessel substantially transversely to the major axis of the supply duct, and

an outlet duct (12) for removing the fluidised material from the vessel.

2. Apparatus according to Claim 1, wherein the outlet duct (12) surrounds the outlet end of the supply duct (1) and is substantially co-axial therewith.

3. Apparatus according to Claim 1 or 2, wherein the inlet end of the outlet duct (12) is protected from ingress of non-fluidised material by a flange member (214) adapted to divert the flow of fluidised material past the underside of the flange member before entering the inlet end of the outlet duct.

4. Apparatus according to Claim 3, wherein the flange member (214) is fitted around a portion (204) of the supply duct that extends into the vessel (11).

5. Apparatus according to Claim 3 or 4, wherein the flange member (214) also assists in directing the fluidised material towards the outlet duct (12).

6. Apparatus according to any one of Claims 3 to 5, wherein the diameter of the flange member (214) is at least equal to the diameter of an adjacent portion of the outlet duct (208).

7. Apparatus according to any one of Claims 3 to 5, wherein the flange member (214) includes a groove (215) on its surface that faces the outlet duct (208).

8. Apparatus according to Claim 7, wherein the outlet duct (208) projects at least partially into the groove (215).

9. Apparatus according to any one of Claims 3 to 8, wherein the distance between the outlet duct (208) and the flange member (214) is adjustable.

10. Apparatus according to any one of the preceding Claims, wherein the supply duct (1) and/or the outlet duct (12) is substantially cylindrical.

11. Apparatus according to Claim 10, wherein the diameter of the outlet duct (208) varies along its length.

12. Apparatus according to Claim 11, wherein an upper portion of the outlet duct (208) is narrower than a lower portion.

13. Apparatus according to any one of the preceding Claims, wherein the fluidiser apparatus is partially housed within a housing (206) extending down from the base of the vessel (11).

14. Apparatus according to Claim 13, wherein a space (209) exists between the inner surface of the housing (206) and the outer surface of the outlet duct (208).

15. Apparatus according to any one of Claims 10 to 14, further including a body portion (202) surrounding the supply duct (204) and substantially blocking the outlet duct (208) apart from an aperture through which the fluidised material can pass.

16. Apparatus according to any one of the preceding Claims, further including an aperture or bore (501) acting as a bypass between the supply duct (204) and the outlet duct (208).

17. Apparatus according to Claim 16, wherein a valve (502) is fitted to the bypass aperture or bore (501).

18. Apparatus according to any one of the preceding Claims, wherein the supply duct includes an L-shaped portion (203) and is connected to a substantially horizontal pipe (1) leading to the fluidising apparatus.

19. Apparatus according to any one of the preceding Claims, wherein the outlet duct includes an L-shaped portion (216) leading to a substantially horizontal pipe (12) leading away from the fluidising apparatus.

20. Apparatus according to any one of the preceding Claims, wherein the supply duct (204) directs the flow of liquid into the vessel (11) in a plurality of directions substantially radially to the major axis of the supply duct.

21. Apparatus according to Claim 20, wherein the outlet end of the supply duct is fitted with a plurality of nozzles (212) arranged radially therearound.

22. Apparatus according to Claim 21, wherein the nozzles are arranged in a plurality of vertical tiers.

23. Apparatus according to Claim 21 or 22, wherein the nozzles produce a fan spray.

24. Apparatus according to Claim 20, wherein the outlet end of the supply duct includes a cap (310) having a plurality of radially arranged slots (314).

25. Apparatus according to Claim 1, wherein the supply duct (1) is remote from the outlet duct (12).

26. Apparatus according to Claim 1, wherein the supply duct (1) is parallel along part of its length with part of the outlet duct (208).

27. Apparatus according to any one of the preceding Claims, wherein a portion (204) of the supply duct extends into the vessel (11) through the base of the vessel.

28. Apparatus according to Claim 27, wherein the portion (204) extending into the vessel (11) has a length shorter than the diameter of the vessel.

29. Apparatus according to any one of the preceding Claims, further including a hydrocyclone adjacent the outlet duct.

30. A vessel (11) fitted with fluidiser apparatus (10) according to any one of the preceding Claims.

31. A vessel according to Claim 30, wherein the vessel (11) is an open pot.

32. A vessel according to Claim 30, wherein the vessel (11) is a closed pot.

33. A vessel according to any one of Claims 30 to 32, wherein the supply duct (1) is connected directly to the outlet duct (12) via a valve (16).

34. A vessel according to any one of Claims 32 to 33, wherein the outlet duct (12) passes through a pressure-reducing cyclone (18).

35. A vessel according to any one of Claims 30 to 34, wherein the flow rate at the outlet duct (12) is sensed and the flow rate of the liquid in the supply duct (1) is controlled accordingly.

36. A method of treating fluidisable material in a vessel, the method including steps of:

supplying liquid under pressure to a vessel, the liquid being emitted into a lower portion of the vessel as one or more jets substantially transverse to the major axis of the supply duct, and

removing the fluidised material from the vessel.

37. Fluidising apparatus substantially as herein described with reference to the accompanying drawings.